Answer on Question #72515-Physics-Electromagnetism

Find the work done in bringing the charge q0 from infinity to any point at a distance r in the field of charge q

Solution

The work done in bringing the charge q0 from infinity to any point at a distance r in the field of charge q is

$$W = U(r) - U(\infty) = \int_{\infty}^{r} F(r)dr.$$

$$F(r) = \frac{kqq_0}{r^2}$$

$$W = kqq_0 \int_{\infty}^{r} \frac{1}{r^2} dr = kqq_0 \left(-\frac{1}{r}\right)_{\infty}^{r} = -\frac{kqq_0}{r}.$$